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10CFR50.55a

NLS2004125
October 25, 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Inservice Inspection Relief Request RI-35
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

Reference: NRC Information Notice 2004-08, dated April 22, 2004, "Reactor Coolant Pressure Boundary Leakage Attributable to Propagation of Cracking In Reactor Vessel Nozzle Welds"

The purpose of this letter is to submit a relief request for Cooper Nuclear Station (CNS) to the Nuclear Regulatory Commission (NRC) for review and approval, in accordance with 10CFR50.55a(a)(3)(i). The Nebraska Public Power District (NPPD) is submitting this relief request as an alternative to existing ASME Boiler and Pressure Vessel Code, Section XI requirements for the repair and examination of Class 1 welds.

This relief request is a contingency for repair of the Reactor Pressure Vessel Control Rod Drive (CRD) nozzle-to-cap austenitic to ferritic weld. As described in the referenced Information Notice, during a drywell inspection at Pilgrim Nuclear Power Station (Pilgrim Station), a flaw was discovered in a CRD capped nozzle-to-cap weld. This flaw required a repair in place. CNS has a similar design for the CRD nozzle-to cap weld, and is scheduled to examine it during the next refueling outage (RE22, January 2005). This relief request includes the use of ASME Code Cases N-638 and N-504-2 (with certain exceptions), and is similar to the relief request submitted by Pilgrim Station (ADAMS Accession No. ML032870328). The NRC has authorized the use of Code Case N-638 and N-504-2 in Regulatory Guide 1.147, Rev. 13. In addition to Pilgrim Station, the NRC staff has approved exceptions from Code Case N-504-1 (an earlier version of N-504-2) and Code Case N-638, for James A Fitzpatrick (TAC No. MB0252, dated October 26, 2000) and for Nine Mile Point Unit 2 (TAC No. MA8352, dated March 30, 2000).

Based on the evaluations contained in Attachment 1, NPPD has concluded that this proposed alternative provides an acceptable level of quality and safety; and therefore, satisfies the requirements of 10CFR50.55a(a)(3)(i). NPPD understands that final NRC approval of the relief request will not be made unless the CRD nozzle-to-cap weld results require its use. Accordingly, NPPD requests NRC review of the repair alternative, with provisional acceptance by January 15, 2005 to support the CNS outage schedule. NPPD will inform the NRC if final approval is required based on the inservice inspection results.

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If you have any questions concerning this matter, please contact Mr. Paul Fleming at (402) 825-2774.

Randall K. Edington
Vice President – Nuclear and
Chief Nuclear Officer

/wrv

Attachment

cc: U. S. Nuclear Regulatory Commission w/attachment
Regional Office – Region IV

Senior Resident Inspector w/attachment
USNRC

NPG Distribution w/o attachment

Records w/attachment

RELIEF REQUEST NUMBER: RI-35

1. ASME CODE COMPONENTS AFFECTED

Code Classes:	1
References:	IWA-4000, IWB-4000
Examination Categories:	B-F
Item Numbers:	B5.10
Description:	Weld Overlay Repair
Component Numbers:	RCA-BF-1

2. APPLICABLE CODE EDITION AND ADDENDA

1989 Addition, No Addenda

3. APPLICABLE CODE REQUIREMENT

IWA-4000 and IWB-4000 of ASME Section XI require repairs to be performed in accordance with the Owner's Design Specification and the original construction Code of the component or system.

4. REASON FOR REQUEST

RCA-BF-1 is the Reactor Pressure Vessel (RPV) Control Rod Drive (CRD) nozzle-to-cap austenitic to ferritic weld. A weld inspection is planned during Refueling Outage 22. If a flaw is detected, then a repair method with a more corrosion resistant material will require draining the RPV. In addition, preheat and post weld heat treatment are required for welding on nozzle material by ASME Section III, Subparagraph NB4622.7. These requirements are highly impractical without draining the RPV, and may distort the P3 components involved. If the RPV is drained, the radiation dose rates in the nozzle area would increase significantly, resulting in increased personnel exposure. In summary, this request is being made to avoid unnecessary personnel exposure, and the potentially significant impacts on the outage schedule.

5. PROPOSED ALTERNATIVE AND BASIS FOR USE

A full structural weld overlay repair will be designed consistent with the requirements of NUREG-0313, Revision 2, Section 4 (which was implemented by Generic Letter (GL) 88-01), ASME Code Cases N-504-2, N-638, and ASME, Section Xl, Paragraph IWB-3640. The design will assume a through wall crack for 360°. It will be applied, if needed, for the weldment associated with the austenitic (nickel-based) to ferritic RPV

CRD return line nozzle-to-cap weld. This weldment falls within the scope of GL 88-01 and is potentially susceptible to intergranular stress corrosion cracking (IGSCC).

No RPV drain down is planned for the overlay, nor for the seal weld repair, if one is necessary. The weld overlay will be completed with water on the inside surface of the nozzle and end cap. The alternative provides an acceptable level of quality and safety without the need for draining the RPV or applying preheat and post weld heat treatments.

EXAMINATION AND REPAIR REQUIREMENTS

Welder Qualification and Welding Procedures- Welders and welding procedures will be qualified in accordance with ASME Section IX and any special requirements from Section XI or applicable code cases. A manual shielded metal arc weld (SMAW) procedure will be qualified to facilitate localized repairs and to provide a seal weld, prior to depositing the overlay. This procedure will make use of UNS W86152 SMAW electrodes consistent with the requirements of ASME Section IX.

Welding Wire Material- The conditions which could initiate the cracking of the N10 nozzle are IGSCC and/or interdendritic stress corrosion cracking (IDSCC) at the inside diameter of the N10 nozzle due to geometric discontinuities and residual repair weld stresses in an oxidizing environment. A consumable welding wire highly resistant to IGSCC and IDSCC will be used for the overlay material. (Note: IGSCC and IDSCC refer to essentially the same phenomenon in the base metal and weld material respectively. For the purpose of this request they are synonymous.) This weld overlay material, designated UNS N06052, is a nickel-based weld filler material, commonly referred to as Alloy 52, and will be applied using the gas tungsten arc welding (GTAW) process. Alloy 52 is identified as F-No. 43 Grouping for Ni-Cr-Fe, classification UNS N06052 Filler Metal. Alloy 52 contains about 30% chromium that imparts excellent corrosion resistance to this material. Alloy 152 welding wire may be used for seal welding activities.

Weld Overlay Design- The weld overlay will extend around the full circumference of the nozzle weldment location in accordance with NUREG-0313, Revision 2, Code Case N-504-2 and GL 88- 01, and BWRVIP-75. The specific thickness and length will be computed according to guidance provided in ASME Section XI, Code Case N-504-2 and ASME Section XI, Paragraph IWB-3640, 1989 Edition. The overlay will completely cover the indication location and the Alloy 182 weld deposit butter with the highly corrosion resistant Alloy 52 material. In order to accomplish this objective, it will be necessary to weld on the low alloy steel nozzle material. A temper bead welding approach will be used for this purpose according to provisions of ASME Code Case N-638. This code case provides for machine GTAW temper bead weld repairs to P No. 3 nozzle materials (SA 508 Class 2) at ambient temperature. The temper bead approach

was selected because temper bead welding supplants the requirement for post weld heat treatment (PWHT) of heat-affected zones in welded low alloy steel material.

Examination Requirements- The repair, pre-service inspection and inservice inspection (ISI) examination of the weld overlay repair will be performed in accordance with the ISI Program, NUREG-0313, Revision 2, GL 88-01, and approved plant procedures as specified by the ISI Repair/Replacement Program. The weld overlay will be examined in accordance with the industry-developed Performance Demonstration Initiative (PDI) procedure. As required by Code Case N-416-2, Non-Destructive Examination will be performed to ASME Section III, 1992 Edition, Subsection NB requirements to the extent practical. Since a weld overlay repair is not described in ASME Section III, a description of the required examinations is provided in the following table. The acceptance criteria for the volumetric examinations will be ASME Section XI, Paragraph IWB-3514, "Standards for Examination Category B-F, Pressure Retaining Dissimilar Metal Welds, and Category B-J, Pressure Retaining Welds In Piping"

Examination Description	Method	Technique	Reference
Weld and End Cap Overlay Surface Area Preparation	PT	Visible Dye	N-504-2
First Two Weld Overlay Layers Surface Exam	PT	Visible Dye	N-504-2
First Two Weld Overlay Layers Thickness Measurements	UT or Mechanical	0° Long. UT or Mechanical Height Measurement	N-504-2
Completed Overlay Thickness Measurements	UT or Mechanical	0° Long. UT or Mechanical Height Measurement	N-504-2
Surface Exam of Final Overlay Surface and Adjacent Band within 1.5t of weld overlay. This is also the Preservice Surface Examination.	PT	Visible Dye	NB-5350 IWB-3514 N-638 N-504-2
Volumetric Exam of Final Overlay and adjacent Band within 1.5t of Weld Overlay This is also the Preservice Volumetric Examination	UT	PDI Procedure	ASME XI Appendix VIII
Preservice Baseline Exam of Final Overlay Outer 25% of Underlying Pipe Wall to Identify Original Flaws	UT	60° Ref. Long. OD Creeping Wave	N-504-2

ALTERNATIVE TO REPAIR REQUIREMENTS

The repair will utilize ASME Code Case N-504-2, "Alternative Rules for Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping," and Code Case N-638, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique," with the following exceptions and clarifications.

Clarification of Code Case N-504-2 for Applicability to Nickel-Based Austenitic Steel- Code Case N-504-2 was prepared specifically for austenitic stainless steel material. An alternate application to nickel-based austenitic materials (i.e., Alloy 52) is requested due to the specific configuration of the nickel-based austenitic weldment.

Exception from Code Case N-504-2 Paragraph (b)- Code Case N-504-2 paragraph (b) requires that the reinforcement weld metal shall be low carbon (0.035 % maximum) austenitic stainless steel. In this application, a nickel-based filler is required and Alloy 52 has been selected in place of low carbon austenitic stainless steel.

Exception from Code Case N-504-2 Paragraph (e)- Code Case N-504-2 paragraph (e) requires as-deposited delta ferrite measurements of at least 7.5 FN for the weld reinforcement. These measurements have no meaning for nickel-based materials and will not be performed for this overlay.

Exception from Code Case N-504-2 Paragraph (h)- Code Case N-504-2 paragraph (h) requires a system hydrostatic test of completed repairs if the repaired flaw penetrated the original pressure boundary or if there is any observed indication of the flaw penetrating the pressure boundary during repairs. A system leak test of completed repairs will be used in lieu of a hydrostatic test.

Use of Code Case N-638 Applicability- Code Case N-638 will be applied for that portion of the weld overlay repair over the nozzle material.

BASIS FOR THE ALTERNATIVE

Clarification of Code Case N-504-2 for Applicability to Nickel-Based Austenitic Steel- The weldment being addressed is austenitic material having a mechanical behavior similar to austenitic stainless steel. The weldment is designed to be highly resistant to IGSCC and is compatible with the existing weldment and base metal materials. Accordingly, this alternative provides an acceptable level of quality and safety. Therefore, Code Case N-504-2 should be interpreted to apply equally to both materials.

Exception from Code Case N-504-2 Paragraph (b)- A consumable welding wire highly resistant to IGSCC was selected for the overlay material. This material, designated UNS N06052 is a nickel-based alloy weld filler material, commonly referred to as Alloy 52, and will be applied using the GTAW process. Alloy 52 contains about 30% chromium that imparts excellent stress corrosion cracking resistance to this material. By comparison, Alloy 82, is identified as an IGSCC resistant material in NUREG-0313 Revision 2 and contains about 18 to 22% chromium while Alloy 182 has a nominal chromium composition of 13 to 17%. Alloy 52 with its high chromium content provides a high level of resistance to IGSCC consistent with the requirements of the Code Case. Therefore, this alternative provides an acceptable level of quality and safety.

Exception from Code Case N-504-2 Paragraph (e)- The composition of nickel-based Alloy 52 is such that delta ferrite is not formed during welding. Ferrite measurement requirements were developed for weld of 300 series stainless steel that require delta ferrite to develop corrosion resistance. Weld of Alloy 52 and Alloy 152 are 100% austenitic and contain no delta ferrite due to the high nickel composition (approximately 60% Ni and low iron content). Alloy 52 with its high chromium content provides a high level of resistance to IGSCC consistent with the purpose for the delta ferrite requirements for stainless steels of the Code Case. Therefore, this alternative provides an acceptable level of quality and safety.

Exception from Code Case N-504-2 Paragraph (h)- In lieu of the hydrostatic pressure test requirements defined in Code Case N-504-2, a system pressure test shall be performed in accordance with the Third Interval ISI Program and Code Case N-416-2 with the exception that the volumetric examination performed shall be an ultrasonic examination of the weld overlay. As required by Regulatory Guide 1.147, Revision 13, for Code Case N-416-2, the hold times for the inservice test will be consistent with the requirements of IWA-5213 of the 1989 Edition of ASME Section XI. These alternative requirements are sufficient to demonstrate that the overlay is of adequate quality to ensure the pressure boundary integrity. Accordingly, this alternative provides an acceptable level of quality and safety.

Use of Code Case N-638 Applicability- Code Case N-638 was developed for temper bead applications to similar and dissimilar metals. It permits the use of machine GTAW at ambient temperature without the use of preheat or PWHT on Class 1, 2, and 3 components. Temper bead welding methodology is not new. Numerous applications over the past decade have demonstrated the acceptability of temper bead technology in nuclear environments. Temper bead welding achieves HAZ tempering and grain refinement without subsequent PWHT. Excellent HAZ toughness and ductility are produced. Use of Code Case N-638 has been accepted in Regulatory Guide 1.147 Revision 13 as providing an acceptable level of quality and safety.

CONCLUSION

Weld overlays involve the application of weld metal circumferentially over and in the vicinity of the flawed weld to restore ASME Section Xl margins as required by ASME Code Case N-504-2. Weld overlays have been used in the nuclear industry as an acceptable method to repair flawed welds. The use of overlay filler material that provides excellent resistance to IGSCC provides an effective barrier to crack extension. The design of the overlay for RPV nozzle weldment uses methods that are standard in the industry for size determination of pipe-to-pipe overlays. There are no new or different approaches used in these overlay designs that would be considered first of a kind or inconsistent with previous approaches. The overlay is designed as a full structural overlay in accordance with the recommendation of NUREG-0313, Revision 2 (which was implemented by GL 88-01), and by Code Case N-504-2 and ASME Section XI Paragraph IWB-3640. Temper bead techniques, as defined by Code Case N-638, will produce a tough corrosion resistant overlay deposit that meets or exceeds Code requirements for the weld overlay.

NPPD concludes that the contingency repair plan is justified and presents an acceptable level of quality and safety to satisfy the requirements of 10CFR50.55a(a)(3)(i).

6. DURATION OF PROPOSED ALTERNATIVE

The proposed alternative applies to the repairs of RPV nozzle-to-end cap weld for the scheduled outage and for the remaining service life of this weld. Re-inspection will be per the BWRVIP-75 Guidelines and Code Case N-504-2.

Correspondence Number: NLS2004125

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	